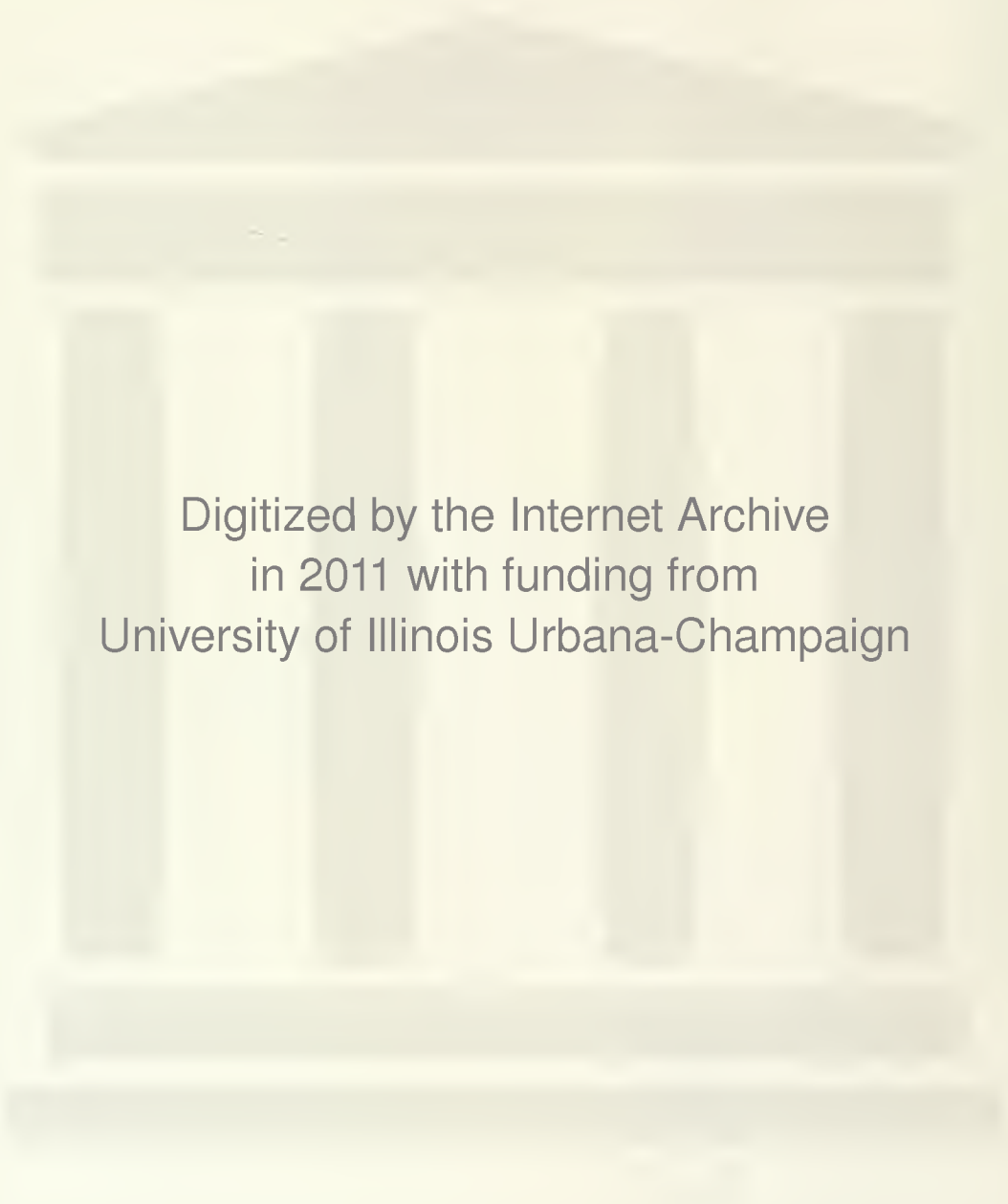

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Organizational Control Systems and the Engineer: The Need for Organizational Power

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"Organizational Control Systems and the Engineer:
The Need for Organizational Power"

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Abstract

Concern for the plight of whistle-blowing professionals has resulted in a number of suggestions for designing organizational control systems to reduce their ethical dilemmas. This paper argues that the suggestions that have been made for feedback control systems to protect the ethical engineer are flawed and based on an inappropriate image of what organizations are and how they function.

The rational fantasies that have guided these suggested control systems are contrasted with the decision making behavior actually observed in organizations, and with the experience of implementing management information systems. Several examples of management decision making on engineering issues are presented. The importance of the process by which managers define an ambiguous situation as a problem, and the role of organizational power in determining management's definition of the situation, is emphasized.

Finally, the responsibility of the professional for defining the framework within which a dialogue on organizational problems are discussed is related to their development and exercise of power.

At the First National Conference on Engineering Ethics, the keynote speaker (DeGeorge, 1980) voiced the proposition that organizations should be designed so that engineers need not be moral heroes.

Westin's (1981) recent collection of case studies concludes with this same theme. The mechanisms that are proposed include statements of organizational principles and policies; procedures for filing complaints of possible violations; an impartial, thorough method for conducting investigations; use of fair-hearing procedures; and an objective decision making process. A strong ombudsman program would be a companion measure to these formal procedures. In essence, these are feedback control mechanisms - communication channels designed to effect an error-reducing control process in the organization. These recommendations can provide valuable and needed improvements in the functioning of large organizations. However, it is important to realize the limitations of these methods of organizational control.

Like the engineer, the management system designer wants to improve the functioning of an organization through the use of feedback control systems. While some improvements have been made, many systems are designed and developed but never successfully implemented or used. Others have too infrequently delivered the improvements that were promised during their design (Schultz & Slevin, 1975). The question is, "why?". My own research suggests that the underlying image of what an

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The author has benefited from discussions with colleagues David Whetten, Department of Business Administration and Dan Alpert, Center for Advanced Study, at the University of Illinois.

organization is and how an organization functions that guides our efforts at system design is partly at fault (Boland, 1978).

Management system designs and the structural reforms proposed by Westin and others are based on a rational-bureaucratic ideal of organizations. The organization is pictured as purposive, directed from the top by a series of commands to subordinates. It is imagined that functional units are coordinated in a machine-like fashion. Standard operating procedures, clearly defined decision making responsibilities and feedback control systems are used to explain the organization's daily functioning.

Most importantly, the organization is assumed to be guided by planning. Planning is a forward looking, intentional process in which goals are defined, alternatives are examined and courses of action are chosen based on the highest return to the organization. There may be some conflict among managers and some decisions may be politically based, but essentially, we assume there is a logical coherence to the organization's activities that emanates from its center of management control. We assume that those higher up on the management ladder see a bigger picture, reconcile competing claims and values, and responsibly choose a direction for the future. Feedback control mechanisms are intended to ensure that higher management has all the relevant data in exercising its global understanding and making management decisions.

DeGeorge, for instance, reviewed the responsibility of the Ford engineers in the Pinto gas tank decision and concluded that their ethical responsibility was met by providing complete and objective data to

top management decision makers. Once the data had been provided, the valuing of alternative courses of action was a management decision, not an engineering decision. The decision made by the Ford executives might have been a good or bad business decision, but the engineer is not morally responsible for it.

A rational-bureaucratic image of Ford is important to DeGeorge's conclusion. If no one in Ford's management actually made any decisions relevant to the Pinto gas tank, if managers who claimed to make such decisions instead engaged in aimless, wandering conversations, or if they routinely ignored critical data presented to them, the engineer could not so easily dismiss his own responsibility. I do not mean to single out DeGeorge or Westin because, as I have said, designers of computer-based and other management systems have also relied primarily on an image of the management process as being comprehensive, coherent, intentional and rational. However, the experience of failures and unmet expectations with computer-based systems suggests that the use of a rational-bureaucratic image to guide their design is often mistaken (Argyris, 1977).

The image of organizations as coherently rational is widely shared in modern society, almost to the point of being a modern mythology of organizations. Yet, no matter how firm its ideological foundations, it is more a flattery to managements than a defensible statement of what organizations are like. When we look at more recent developments in the theory of organizations we see a movement away from the rational-bureaucratic image. Field research that observes management decision making in action reveals a much more chaotic, much less coherent process than we so often imagine.

Mintzberg's (1973) observations of top managers' daily activities reveals an unrelenting sequence of brief, isolated events. The manager encounters one fragmented, disjoint demand for attention after another, most of which last for only a few minutes or less. The manager's preference is for action rather than reflection and the image of the thoughtful superior who surveys the big picture and comprehends how the whole organization fits together is nowhere to be seen. Cohen and March (1972), in observing the decision making of management groups, describe the process as a "garbage can" in which problems, solutions, and choice opportunities swirl in a chaotic vortex. They see pet solutions that are looking for problems, choices that are looking for excuses to be made and executives that are looking for things to do. They do not see the careful definition of problems, the posing of alternative solutions and the rational choice among alternatives that we so often attribute to the management process.

Carl Weick (1979) concludes from his work that the goals which we suppose management pursues are often only identified retrospectively--after managements have satisfied their primary preference for unreflective action and find that they must give an account of what they have done. They must make sense of their action after the fact because it was not done before the fact. Thus, Weick argues, an evolution-based theory of organization, emphasizing that most management actions are random variations which are selectively retained and retrospectively rationalized is at least as appropriate as rational-bureaucratic theories that emphasize coherent understanding and pre-planning.

Finally, Salancik and Pfeffer (1977, 1978) conclude from their observations of management decision making in a wide variety of settings that the management process is best understood as the struggle of a plurality of power positions within the organization, none of which are based on a global image. Each power group has its own definition of what the problems faced by the organization really are. These "definitions of the problem" are tied to actions each group has power over, not to an understanding of the whole. Marketing people see problems of customer satisfaction, market penetration, and product differentiation. Production people see quality control, cost-per-unit, and maintenance problems. Finance people see cash flow, capital sources, and portfolio of investment problems.

Groups have power not because their understanding of the organization is coherent, complete or wise, but because they control a resource seen as critical to its continued functioning. Control over funds, markets, labor, supplies or information can all be sources of power, depending on the nature of the environment. What is seen as critical is primarily socially defined.

We see for example, that the backgrounds of company presidents changes over time as the critical factors in the environment change (Salancik and Pfeffer, 1977). In the period from 1940 through 1960 we saw engineering as the predominant background; from 1960 through 1970 it was marketing that provides presidential training; and from 1970 on the emphasis has been on financial backgrounds for corporate leaders. These changes in leadership emphasis and in ways of seeing the organization's problems are the result of the struggle of power groups

within the organization in light of a cultural image of rational management.

Power is not evil and the fact that organizations have multiple, competing centers of power is not bad. Rather, the responsible exercise of power by various groups within the organization is part of a necessary process of aligning the organization with the appropriate factors, resources and problems of its environment--including the technical, legal, economic and social aspects. The need for the responsible development and exercise of power in addition to the establishment of feedback control mechanisms--is the central point of this paper.

Before exploring power and the engineer, an example of recent management decision making will highlight the more chaotic approaches to theories of organization that I have just described. General Motors Corporation is often cited as a paragon of modern management. Their unique blend of centralized financial control and decentralized operations developed by Sloan in the 1920's is widely copied. Yet, even General Motors can fail to perceive important problems until it is too late to respond. Their failure to define the 1973 oil embargo as indicating a significant shift in their environment, requiring a redefinition of plans and standards, is a case in point. Joseph Kraft (1980), intrigued by this apparent failure, investigated how and when General Motors finally did define the problem of oil shortages as significant, and decided to produce fuel-economic vehicles. He refers to this as the "downsizing decision." After interviews with automobile executives, oil industry leaders, government regulators, and the top management of General Motors, he concluded that "nobody seemed altogether sure how it came about."

Each executive he interviewed identified different dates, different committees, different cars being discussed, and different people being involved in making the "downsizing decision." Kraft concludes that a Department of Transportation official is probably closest to the facts when stating: "Nobody at GM could tell you how the downsizing decision was made because nobody knows. The fact is that GM didn't make the decision by itself. The government helped...(p. 155)." He goes on to argue that what GM did was respond, in multiple, disjoint ways to a series of environmental pressures including the fuel-economy standards, the continued rise in oil prices, and the small cars being produced by foreign competitors, until, at some point in late 1975, they discovered that they were involved in a major program of downsizing. Looking back they could see precedents for smaller cars: the corvair, the tempest, and so on. They could argue that those experiments were ahead of their time but now the conditions were right. Another explanation would be that the earlier attempts were merely random mutations that occur frequently in a decentralized company, and that the environmental pressure of new federal regulations selected the pattern of behavior we now call downsizing.

There was no purposeful, coherent plan at work. No comprehensive vision within which competing claims were valued and "objective data" were evaluated. Instead, there are a series of fleeting discussions passing rapidly and irregularly from one isolated topic to another. The rational-bureaucratic image is a fantasy proposed by those outside the supposed inner-circle of understanding. It is a fantasy entertained by engineers to avoid their individual responsibility and to

compensate for their own lack of coherent understanding of what the organization is doing. Becoming a manager is the major reward available to an engineer in an organization, and so the rational image is also a fantasy of the special knowledge that will come at the end of a successful career.

It's interesting to note that an engineer, Kettering, was actively working within GM to define the coming of the fuel shortage problem and the need for fuel efficient cars in the late 1930's. Yet, the loss of power by engineers and the gain of power by marketing and especially finance, never allowed the company to take that definition of their central problem seriously.

We can see this same theme--that critical decisions will not be made unless the key power centers define the terms of discussion appropriately-in the Pinto gas tank case. In Westin's latest book of cases we see the report of Frank Camps, a Ford engineer involved in the Pinto windshield design. Here we learn that the windshield design problem was solved by routing the energy of a head-on impact through the drive shaft towards the gas tank. So, while the Board of Directors are debating the costs and benefits of a seven dollar shield for a rear collision, the company is busily setting in motion a confluence of events that are otherwise determining the basic integrity of the Pinto gas tanks. The Board of Directors is not discussing the problem that way, though. And so no decision will be made about it. As long as the power centers of marketing and finance define the problem as one of styling trade-offs or cost-per-unit of production, the Board will not make any other types of decisions.

Even if Mr. Camps could relay his fears about the windshield directly to the Board of Directors, they would still have to redefine the gas-tank-shield situation in terms of much larger scope, dealing with a company-wide failure to create a reliable design process, before they could profitably use his information. That type of problem redefinition, challenging the terms with which a situation is being discussed, comes from the critical exercise of power that engineers should accept as their responsibility. Feedback control systems are helpful in aiding the concerned engineer to express his or her doubts, but unless they speak to a problem within the terms that have been formulated by the power struggle, they will be minimally effective. What can engineers do? First, they can realize that the exception-based feedback control mechanisms so often suggested are nice but will not solve the problems they experience. They are inspired by a fantasy of rational management that has little relation to real organizations. Second, they can accept the responsibility to develop and exercise power within organizations so they can affect the quality of dialogue and the way of defining situations that emerge from power struggles.

Engineering, with its wide-spread impact on the critical needs of innovation, productivity and regulatory requirements, has control over resources that should be an important base of power. In addition, engineers have other characteristics that tend to enhance power in organizations. They are professionals with their own language; experts with control over secrets useful to others. The work of an engineer is hard to evaluate, especially by the uninitiated. Finally, in one form or another, engineers have control over information that others

in the organization need, and they are in a position to create a sense of obligation in others for sharing that information.

The engineer can be the source of his or her own undoing by failing to take advantage of their potential for developing a power center in the organization. To the extent that they allow their work to be proceduralized and routinized, they lose the basis for developing power. To the extent that they allow themselves to be physically isolated, with limited reporting status, they lose the possibility of developing power. If they allow a narrow definition of their task and responsibilities to be imposed on their work, they further lose power. And if they allow the organization to use outside consultants for non-routine problems on a regular basis, they will have little left in the way of a power base.

In order to effectively develop and exercise power, engineers in organizations can take several positive steps. First, they must establish themselves as participants in as wide a range of activities within the organization as possible. They should increasingly insist on the use of teams in which engineers can play key liaison roles linking different departments together in a common problem focus. They should insist on having participation in these problem solving teams from the first, early stages of a decision process through its final conclusion.

Engineers should work to develop an effective network of peer communication throughout the organization; avoiding physical isolation from other engineers and creating opportunities for meeting on a regular basis to discuss common concerns, and develop positions with respect to them. Finally, they must learn to use their unique control

over the critical resources of information and innovation to establish their agenda and concerns as an integral part of the organization's dialogue on its problems. At times this might require holding back certain projects or analyses. At other times it may mean sharing their influence to support another group who will later be in a position to reciprocate.

The engineers' control over information need not be exotic or esoteric to be effective. Michael Crozier's study of a French cigarette factory revealed considerable power being wielded by the maintenance engineers. They exercised this power because the complicated production machinery was subject to unexpected breakdowns and they kept their knowledge of repair solutions secret, under lock and key or in their own heads (Salancik and Pfeffer, 1977).

For engineers who would seek to increase their power within organizations, perhaps the most important lesson to learn is that change in organizations is most frequently and effectively instituted by external pressures--not by internal deliberation. It is here that the engineer is in a very strong position to develop external contacts which will share their definition of the organizations' problems and will work to shape the external environment and thereby the forces for change being placed on the organization. Engineers make a mistake if they agree to the frequently cited claim that an employee must first and foremost recognize the organization's right to privacy and must exhaust appropriate organizational channels before sharing troublesome information with outside parties. Quite the contrary, concerned engineers enhance their ability to control the dialogue of management if

they can have their views incorporated into the set of external pressures being put on the organization by legislatures, regulatory agencies, customers, suppliers, and special interest groups.

The engineer cannot retreat behind the shield of management decision making. What we imagine to be a rational, coherent, comprehensive management process is a shifting, dynamic struggle between diverse, partial and incoherent centers of power.

Professional responsibility cannot rest on allegiance to such a shaky ground. Instead, the engineer must accept responsibility for participating in the power struggle that is the management process. Only by creating the terms of the dialogue within which their misgivings are to be heard can engineers claim to have met their professional responsibilities.

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